Biochemical Experimentation on Microfabricated Devices

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The first condensed phase chemical separations were performed on a microfabricated device (microchip) nearly a decade ago. Although first viewed as a curiosity, microchip separations have gained increasing interest over the past few years. Some attributes of this technology are the ability to perform moderately efficient separations 10 to 100 times faster than conventional technology while utilizing sample volumes that are 100 - 10,000 times smaller. In addition microchips promise to monolithically incorporate sample processing procedures, which allows automation of chemical and biochemical assays. We have been working on a number of microfabricated technologies that relate to the production of biochemical information. We have recently shown that microchip devices can be used for rapid, high-resolution separations of amino acids, peptides, and proteins. Moreover, integration of chemical processes such as proteolitic degradation and fluorescence derivitization have been incorporated. Cellular manipulations on microfabricated flow cytometry devices have also been demonstrated that include staining of cells with various dyes, incubation with antibodies, and cell lysis. The operation and performance characteristics of these devices will be discussed.

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